

Claims

1. A fuel injection system for an internal combustion engine, with a respective high-pressure fuel pump (10) and a fuel injection valve (12) connected to it for each cylinder of the internal combustion engine, wherein the high-pressure fuel pump (10) has a pump piston (18) that is driven into a stroke motion and delimits a pump working chamber (22), which can be connected to a low-pressure region (25) via a connection (21) that is controlled by an electrically actuated control valve (60), wherein the fuel injection valve (12) has an injection valve element (28) that controls at least one injection opening (32) and is acted on in an opening direction (29) by the pressure prevailing in a pressure chamber (40), which can be connected to the pump working chamber (22), wherein an electrical control element (64) controls an opening and closing motion of the injection valve element (28), wherein a pressure reservoir (68) is also provided, that communicates with the pump working chamber (22) via a connection (66) through which fuel is delivered into the pressure reservoir (68) during the delivery stroke of the pump piston (18) and that also communicates with the pressure chamber (40) of the fuel injection valve (12) via the connection (66) through which the pressure chamber (40) can be supplied with fuel from the pressure reservoir (68) for a fuel injection via the fuel injection valve (12) independent of the delivery stroke of the pump piston (18), characterized in that the connection (66) of the pressure reservoir (68) to the pump working chamber (22) and pressure chamber (40) contains a coupling device (70; 170; 270), which contains a sliding piston (74; 174; 274) that is acted on at one end by the pressure prevailing in the pressure reservoir (68) and is acted on at the other end by the pressure

prevailing in the connection (66), that the piston (74; 174; 274) executes a delivery stroke oriented toward the pressure chamber (40) in order to execute a fuel injection, and that the coupling device (70; 170; 270) contains a bypass connection (76, 77; 176; 276, 277) via which the connection (66) communicates with the pressure reservoir (68).

2. The fuel injection system according to claim 1, characterized in that the bypass connection is comprised of a conduit (76; 176; 276) that extends through the piston (74; 174; 274) and contains a throttle restriction (77; 177; 277).

3. The fuel injection system according to claim 1, characterized in that the bypass connection is comprised of a conduit (176) that is formed between the outer circumference of the piston (174) and a cylinder bore (172) in which the cylinder (174) is guided.

4. The fuel injection system according to one of claims 1 to 3, characterized in that the piston (74; 174) executes a stroke oriented toward the pressure reservoir (68) in order to fill the pressure reservoir (68).

5. The fuel injection system according to claim 4, characterized in that the piston (74; 174; 274) can be moved between a definite end position oriented toward the pressure reservoir (68) and a definite end position oriented toward the connection (66).

6. The fuel injection system according to claim 4, characterized in that at least one spring element (178, 180; 280) acts on the piston (174; 274) in the direction of at least one end position.

7. The fuel injection system according to claim 5, characterized in that each of the spring elements (178, 180) acts on the piston (174) in the direction toward a respective end position and that between two successive injection cycles, the spring elements (178, 20) hold the piston (174) in a definite intermediate position between the two end positions.

8. The fuel injection system according to claim 4, characterized in that between two successive injection cycles, a spring element (280) holds the piston (274) in its end position oriented toward the pressure reservoir (68).

9. The fuel injection system according to one of the preceding claims, characterized in that a pressure relief device (69) is provided, which limits the pressure in the pressure reservoir (69) to a predetermined value.